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<p>(54) Title: FOLDING WORKBENCH</p> <p>(57) Abstract</p> <p>The working surface of the workbench is formed in two parts (210b, 210a). The front part (210a) is of harder-wearing material than the rear. The workbench is attached to a wall and an adjacent floor by brackets (216, 223) and pivots between an operational position (see Figures 1 and 3), in which the working surface is horizontal, and a stored position (see Figures 2 and 4), in which the workbench is raised clear of the floor. Storage shelves remain horizontal and accessible throughout. A gas strut (232) assists raising and lowering. A link (248) assists positioning of the brackets (216, 223) during installation. The workbench can optionally be floor-mounted only (Figure 6) or completely free-standing. The space requirements of the workbench are low, particularly in its stored position.</p>			

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FOLDING WORKBENCH

5 This invention relates to folding workbenches which can be used, for example, in workshops and elsewhere.

10 An object of the invention is to provide a workbench which can be conveniently folded from an operational position to a stored position and which has low space requirements when stored.

15 The term "workbench" is used throughout this specification and its claims to cover not only articles intended for use as a bench, for example in a workshop, but also uses such as writing, sewing and any other use, domestic, business, or otherwise.

20 According to the invention there is provided a folding workbench comprising a member providing at least part of a working surface, means adjacent a first, rear edge of the working surface member for pivotal attachment of the working surface member to a wall or other rear support means, means spaced forwardly towards a second, front edge of the working surface member for providing support between the working surface member and a floor or other support surface below in an operational position in which the working surface of the working surface member extends

25 in a substantially horizontal plane, the front support means being pivotal relative to the working surface member for movement between a supporting position and a folded position adjacent the face of the working surface member opposite to the working surface, the working surface member being pivotable in use upwardly from its operational position to a stored position in which it extends in a generally vertical plane.

30 Preferably the workbench includes storage means which are foldable with the front support means and

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which are accessible from the front of the workbench in its operational position and remain accessible in its stored position.

5 Advantageously, control means are provided to ensure that movement of the working surface member from its stored to its operational position, and vice-versa, is accompanied by a corresponding movement of the support means between its supporting and folded positions.

10 Preferably, these means are arranged to ensure that the front support means maintains a constant orientation during movement of the working surface member between its two positions. The support means thus undergoes translational motion only.

15 Conveniently, the means controlling the movement of the support means comprises a radius arm which is attached at one of its ends to the support means and at its other end to a fixed anchorage.

20 The anchorage may be on the attachment means, or may be for location elsewhere, for example on the said wall or other rear support means, or on the floor, or other surface, on which the support means acts.

25 Preferably, the or each radius arm forms, together with the portions of the working surface member and the support means between the respective pivots, a parallelogram linkage.

30 Preferably, the attachment means comprises one or more anchorages for attachment to a supporting wall, the working surface member being pivotally attached to the anchorage(s). The workbench is thus wall-mountable.

35 Otherwise, the attachment means may comprise one or more upwardly-extending support members, the lower ends of which engage the support surface and to which the working surface member is pivotally attached at

locations spaced upwardly from the lower ends. The workbench can then be secured to a floor, either adjacent a wall or elsewhere.

5 In another arrangement the workbench is free-standing and the support member(s) form part of a free-standing support frame, to which any radius arms, or other control means components, may also be attached.

10 Counterbalancing means are advantageously provided to compensate for the weight of the workbench when being moved between its operational and its stored positions. The counterbalancing means may take the form of one or more gas springs. The counterbalancing means may be adjustable to compensate for changes in weight, for example caused by loading of any storage means.

15 Advantageously, a portion of the working surface adjacent its front edge is formed by part of the support means, the working surface is thus formed in two portions which can conveniently be formed from different material, for example a harder wearing material such as wood for the front portion and a lighter plastics laminate for the rear portion which tends to have to take less wear-and-tear.

20 25 The construction just mentioned has the advantage that, when control means as mentioned above are provided, the front portion of the working surface remains horizontal during folding and unfolding of the workbench. Tools and workpieces can therefore be left on this surface during these operations.

30 35 When a workbench according to the present invention is wall-mounted, it is then foldable for use from a stored position in which the working surface member lies above the attachment means and parallel to the wall. This arrangement has the advantage that the space beneath the working surface member in its

5 operational position is not occupied by the workbench in its folded position either, and the corresponding floor space can be used for storage. Any storage means is at a conveniently accessible height in the folded position.

 Embodiments of the invention will now be described by way of example with reference to the drawing, in which:

10 Figure 1 is a perspective view of a folding workbench in its operational position,

 Figure 2 is an end view of the workbench of Figure 1, in its folded position,

15 Figure 3 is a view corresponding to Figure 1 of a second workbench,

 Figure 4 is a view corresponding to Figure 2 of the workbench of Figure 3,

20 Figure 5 is a perspective view of a third workbench, shown between its stored and operational positions, and

 Figure 6 is a view corresponding to Figure 5 of a fourth workbench.

25 The workbench shown in Figures 1 and 2 of the drawings comprises a rectangular working surface 10. The working surface 10 is divided into a front part 10a and a rear part 10b which provide, respectively, approximately one third the depth of the working surface and two thirds of its depth. The front part 10a of the working surface also extends a distance vertically down the front of the workbench. This vertical part 10c and the front part 10a are formed integrally or are joined together and are separate from the rear part 10b which meets the front part 10a with a close fit along a join line 10d. The front and vertical parts 10a, 10c are formed from solid or laminated wood; the rear 10b part is formed from a

plastics laminate material.

The working surface 10 is about 1.2 m wide and about 0.70 m deep.

5 The working surface 10 has at each of its ends a support structure, of which only one is visible in the drawing. Each support structure includes a support leg 12 which has a first, vertical portion 12a and a second, horizontal portion 12b. The vertical part 10c of the working surface is attached to the upper part of 10 the vertical portion 12a of the support leg 12 and the front part 10a to its horizontal part 12b.

15 The support leg 12 terminates at the rearward end of its horizontal portion 12b in a mitred joint where it meets a horizontal end support 14 which is attached to the rear part 10b of the working surface 10. The end support 14 has a mitred joint at its rearward end where it meets an attachment member 16 which is secured to a wall or other convenient vertical support surface.

20 The rearward end of the horizontal part 12b of the support leg 12 is attached to the forward end of the end support 14 by a hinge 18. The rearward end of the end support 14 is attached to the attachment member 16 by a further hinge 20.

25 A strengthening plate 22 is attached to the support leg 12, between its vertical and horizontal portions 12a, 12b. A linking arm 24 is pivotally mounted at its rear end on a bracket fixed to the attachment member 16. Close to its front end, the linking arm 24 is fixed to the strengthening plate 22. 30 Pivot pins 26, 28 secure the arm 24 to the bracket on attachment member 16 and to the strengthening plate 22.

35 The arm 24 extends forwardly beyond the pivot pin 28 and has a right-angled extension part 30 which extends parallel and close to the vertical portion 12a of the support leg 12. The free end of the extension

part 30 is pivotally attached to one end of a gas spring 32 which is pivotally attached at its other end to a suitable support bracket further down the vertical part 12a of the support leg 12.

5 The structure at the opposite end of the workbench corresponds exactly to that just described.

10 A cross rail 34 joins the vertical parts 12a of the two support legs close to their lower ends. Between the rail 34 and the vertical part 10c of the working surface, a storage unit is formed by end panels 36a, 36b, a floor panel 38, first and second vertical dividers 40a, 40b and three horizontal shelves 42a, 42b, 42c which, together with the vertical dividers 40a, 40b, partition the storage space into six separate compartments. The compartments are closed at their rears by a vertical panel which is not visible in the drawing. Any other arrangement of shelves and vertical dividers in the storage space is of course also possible.

15 20 25 The storage unit can be fitted with doors, a roller blind or a similar closure which may be lockable. The shelves can be replaced fully or partially with drawers or with a rack for instrumentation. The central part of the storage unit can be omitted to provide a knee-hole.

The working surface can be fitted with conventional items such as a vice 46, holes or stops for securing workpieces and tools to the bench.

20 30 35 Figures 3 and 4 show a second, modified workbench. The parts of the workbench of Figures 3 and 4 corresponding to those of the workbench of Figures 1 and 2 are designated by reference numerals increased by "100" compared with the reference numerals of Figures 1 and 2. Only the points of difference between the two workbenches will be described.

Instead of the linking arms 24 extending between the strengthening plates 22 and the attachment members 16, the workbench of Figures 3 and 4 has a pair of swinging radius arms 124, each of which is pivotally attached at 128 to a bracket 122 attached to the lower end of a respective support leg 112. The other end of each swinging arm 124 is pivotally attached at 126 to a bracket 123. A gas spring 132 extends between each bracket 123 and the respective swinging arm 124.

5 The length of the swinging arms 124 is chosen to ensure that the support legs 112 remain vertical during movement between the folded and unfolded positions of the workbench.

10 As a result of these changes, the attachment members 16 are replaced by brackets 116, to which the end supports 114 are pivotally attached at 120. The strengthening plates 22 are dispensed with and instead the horizontal parts 112b of the support legs 112 widen towards their forward ends. The joints between the support legs 112 and the end supports 114 are now formed by the rearward ends of the support legs 112b overlapping the end supports 114.

15 The workbench of Figures 3 and 4 is installed by attachment of the brackets 116 to a convenient wall, or other vertical surface, as before. The brackets 123 are however attached to the floor, or other horizontal surface, at locations to the rear of the support legs 112 and below the end supports 114. This construction of the workbench of Figures 3 and 4 lessens the load placed on the wall or support surface, compared with the workbench of Figures 1 and 2. It is therefore more suitable to applications where the wall would not withstand the load imposed by the workbench of Figures 1 and 2.

20 The third workbench, shown in Figure 5,

corresponds closely to the second workbench. Reference numerals increased by a further "100" are used to indicate corresponding parts. Only the major parts are given reference numerals. The third workbench differs
5 from the second by the presence of an additional link 248 between each end support 214 and its adjacent swinging arm 224. The links 248 have no functional purpose after installation of the workbench but serve to position the wall brackets 216 and the floor
10 brackets 223 correctly relative to each other during installation.

Figure 6 shows a fourth workbench which corresponds closely to the third. Reference numerals increased by another "100" are used to indicate corresponding parts. In this workbench, the brackets 216 and 223 are formed as one-piece supports 350 which have holes 352 for attachment to the floor, to provide for mounting away from a wall. In a further modification, the lower parts of the supports 350 can be made of a size suitable for allowing the workbench
15 to be completely free-standing. A suitable size would be, for example, that attained if the floor-contacting parts of the supports 350 were to extend behind the upright parts in a mirror image of the floor-contacting parts which extend in front and can be seen in Figure
20 6. A free-standing frame can be provided with castors or other wheels to assist mobility.
25

In Figures 5 and 6, the storage shelves are replaced by open trays.

30 Figure 1 shows the first workbench in its operational position, it being understood that the lower end of the support legs 12 are in contact with the floor of, for example, a workshop and that the attachment members 16 are secured to an adjacent wall
35 or other convenient vertical surface.

The height of the workbench from the floor is about 0.85 m.

5 The folded condition of the workbench is shown in Figure 2, from which it will be seen that folding of the workbench takes place with a movement of the rear part 10b of the working surface 10 about the second hinges 20 in an clockwise direction as seen in Figure 1. This movement is accompanied by a corresponding anti-clockwise movement of the support leg 12 relative to the end support 14 about the axis of the hinges 18. During the folding movement, the portions of the arms 24 between the pins 26, 28 form, together with the attachment members 16, the end supports 14 and the portion of the strengthening plate 22 lying between the 10 hinges 18 and the pins 28, a parallelogram linkage which ensures that the support legs 12 remain in a vertical orientation throughout the folding movement. This in turn ensures that the storage unit at the front 15 of the workbench retains, throughout the folding movement, a position in which its horizontal surfaces remain horizontal. This has the considerable advantage that items placed in the storage unit can remain there during the folding and unfolding movement. The storage means can therefore be utilised continuously with the 20 workbench in either position and during movement from one position to the other. It will also be seen that, during the folding and unfolding movements, the front part 10a of the working surface remains horizontal. Tools or workpieces can therefore be left on this 25 surface during these operations.

30 The unfolding movement of the workbench is a simple reversal of the folding movement.

35 The gas springs 32 have a counterbalancing effect and act on the pivot arms 24 during the folding and unfolding movement, in order to assist with the upward

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movement during folding and to retard the downward movement during unfolding. The force of the gas springs is chosen to exert a force which is insufficient to overcome the turning moment about the 5 pivots 20 in the operational position but sufficient to maintain the workbench in its stored position, in which its weight acts at a much lesser distance from the pivots 20. The force of the gas springs can be made adjustable to compensate for different loads, for 10 example caused by items in the storage unit. This can be achieved, for example by making the positions of the lower attachments of the springs adjustable.

The folding and unfolding operations of the 15 workbench of Figures 3 and 4 correspond very closely to those for the workbench of Figures 1 and 2. The gas springs 132 assist with the lifting of the workbench from the unfolded to the folded condition and retain the workbench in the folded condition.

The workbenches shown in Figures 5 and 6 fold and 20 unfold exactly as the workbench of Figures 3 and 4.

In any of the workbenches, suitable safety catches can be fitted to prevent inadvertent folding or unfolding of the bench.

Adjustable feet and attachment members can be 25 provided to compensate for irregularities in the support surfaces.

The attachment members in Figures 1 and 2 can, if desired, extend above the hinges 20.

The attachments to the wall and, in Figures 3 and 30 4, to the floor can be replaced by attachments to any other convenient supports, for example on a free-standing frame.

CLAIMS:

1. A folding workbench comprising a member providing at least part of a working surface, means adjacent a first, rear edge of the working surface member for pivotal attachment of the working surface member to a wall or other rear support means, means spaced forwardly towards a second, front edge of the working surface member for providing support between the working surface member and a floor or other support surface below in an operational position in which the working surface of the working surface member extends in a substantially horizontal plane, the front support means being pivotal relative to the working surface member for movement between a supporting position and a folded position adjacent the face of the working surface member opposite to the working surface, the working surface member being pivotable in use upwardly from its operational position to a stored position in which it extends in a generally vertical plane.
2. A workbench according to claim 1, including storage means which are foldable with the front support means and which are accessible from the front of the workbench in its operational position and remain accessible in its stored position.
3. A workbench according to claim 2, in which the storage means have closure means.
4. A workbench according to any preceding claim, including control means for ensuring that movement of the working surface member between its stored and operational positions is accompanied by a corresponding movement of the support means between its supporting and folded positions.
5. A workbench according to claim 4, in which the control means ensure that the front support means maintains a constant orientation during movement

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between its supporting and folded positions.

6. A workbench according to claim 5, in which the control means comprises at least one radius arm which is pivotally attached at one of its ends to the 5 front support means and at its other end to a fixed anchorage.

7. A workbench according to claim 6, in which the other end of the or each radius arm is pivotally attached to the rear attachment means.

10 8. A workbench according to claim 6, in which the other end of the or each radius arm is pivotally attached to an anchorage positioned for attachment to the said support surface.

15 9. A workbench according to any preceding claim, in which the attachment means comprises one or more anchorages for attachment to a supporting wall, the working surface member being pivotally attached to the anchorage(s).

20 10. A workbench according to any of claims 1 to 8, in which the attachment means comprises one or more upwardly-extending support members, the lower ends of which engage the support surface and to which the working surface member is pivotally attached at locations spaced upwardly from the lower ends.

25 11. A workbench according to claim 10, in which the lower end of the or each support member comprises an anchorage positioned for attachment to the said support surface.

30 12. A workbench according to claim 10, in which the support member(s) form a part of a free-standing support frame of the workbench.

13. A workbench according to claim 6, in which the anchorage(s) form a part of a free-standing support frame of the workbench.

35 14. A workbench according to claims 12 to 13, the

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frame having wheel means to assist its mobility.

15. A workbench according to any preceding claim, including counterbalancing means to compensate for the weight of the workbench when being moved between its operational and its stored positions.

5 16. A workbench according to claim 15, in which the counterbalancing means comprise one or more gas springs.

10 17. A workbench according to claim 15 or 16, in which the counterbalancing means are adjustable to compensate for changes in the weight of the working surface member and the support means.

15 18. A workbench according to any preceding claim, in which a portion of the working surface adjacent its front edge is formed as a portion of the support means, whereby the working surface is formed in front and rear portions.

20 19. A workbench according to claim 18, in which the front and rear portions of the working surface are of different materials.

25 20. A workbench according to claim 19, in which the front portion of the working surface is of harder-wearing material than the rear.

21. A folding workbench substantially as hereinbefore described with reference to the drawings.

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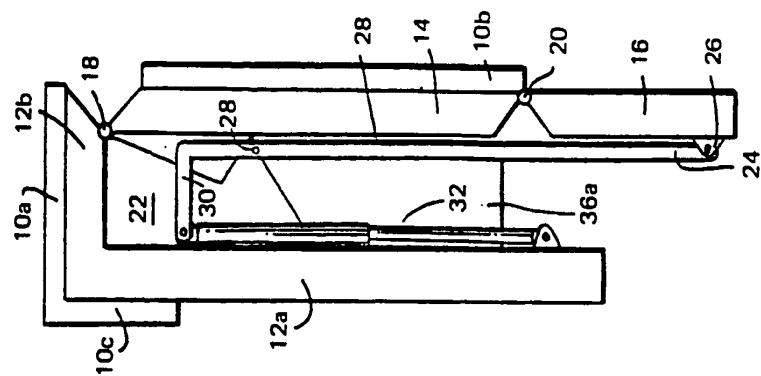


FIG. 2

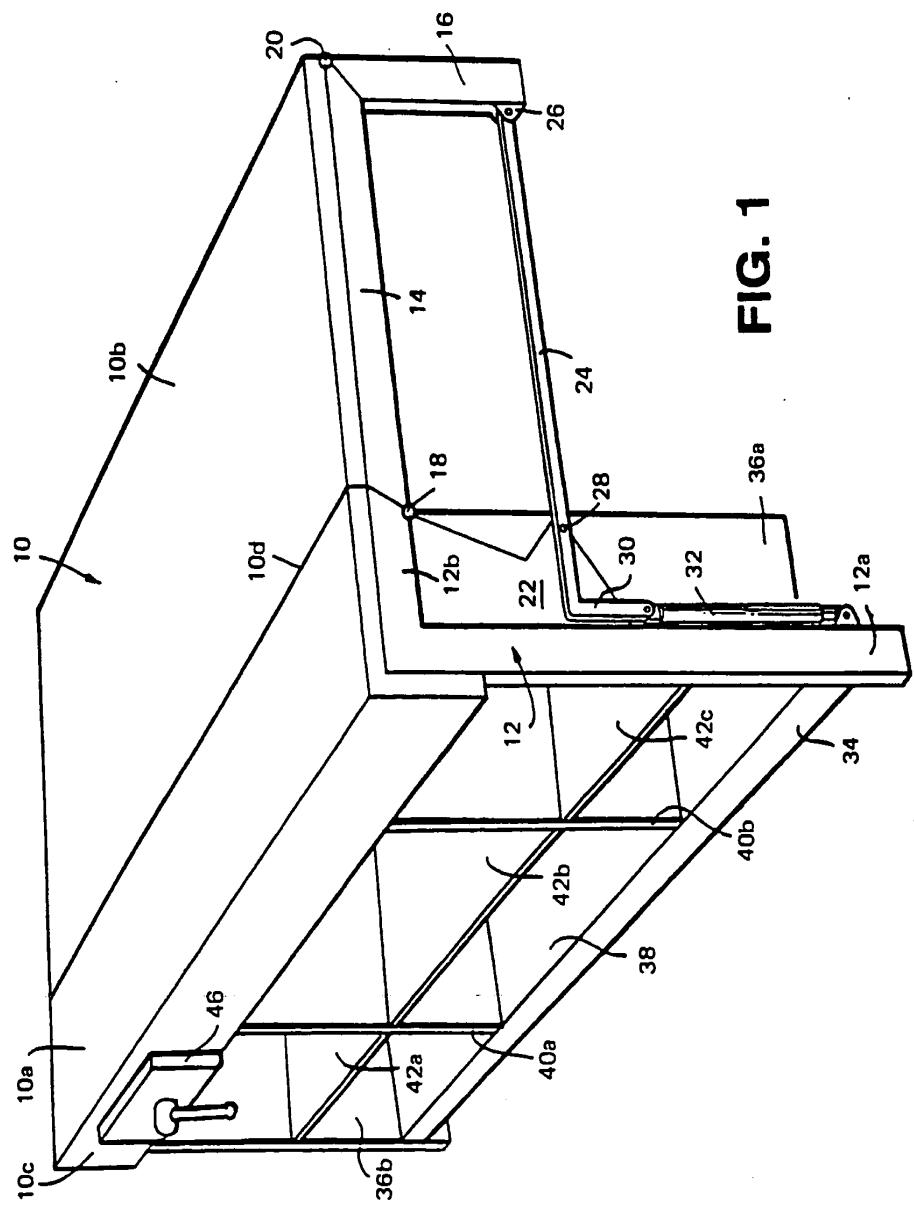


FIG. 1

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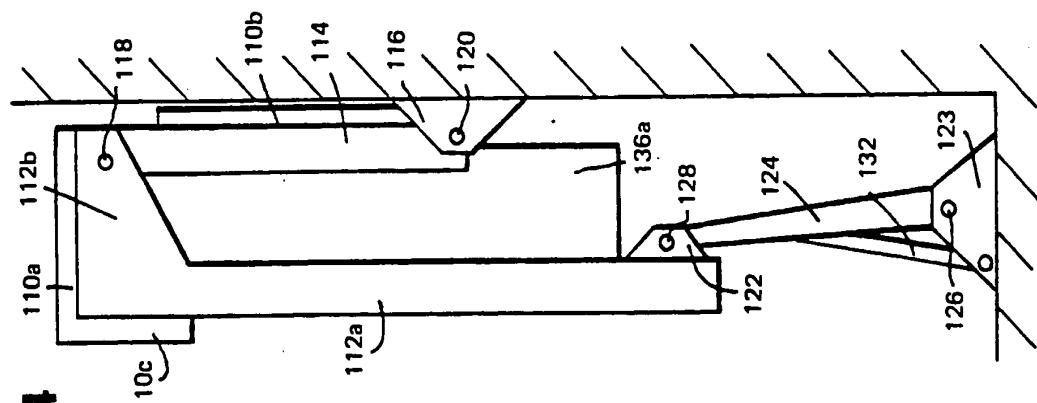


FIG. 4

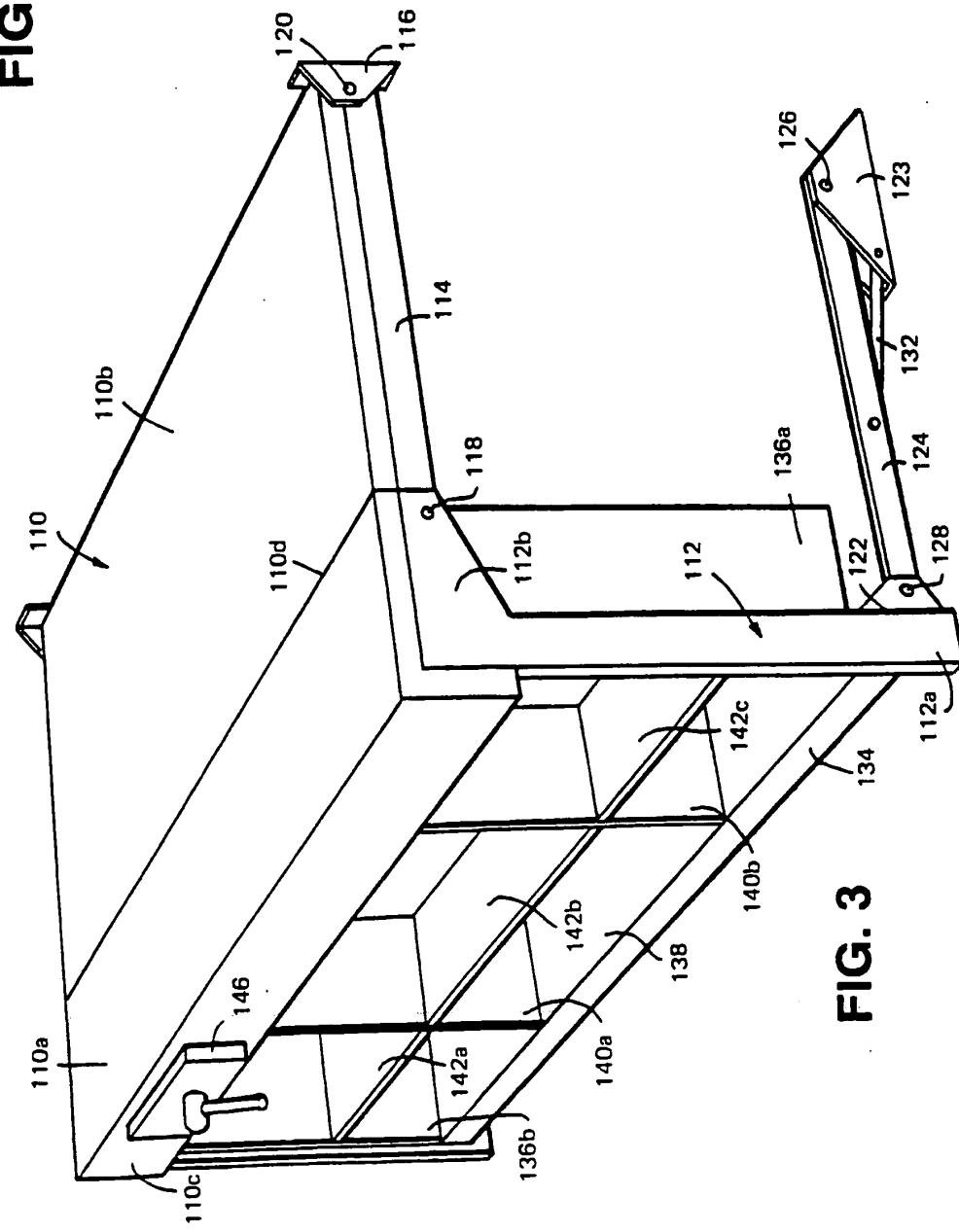
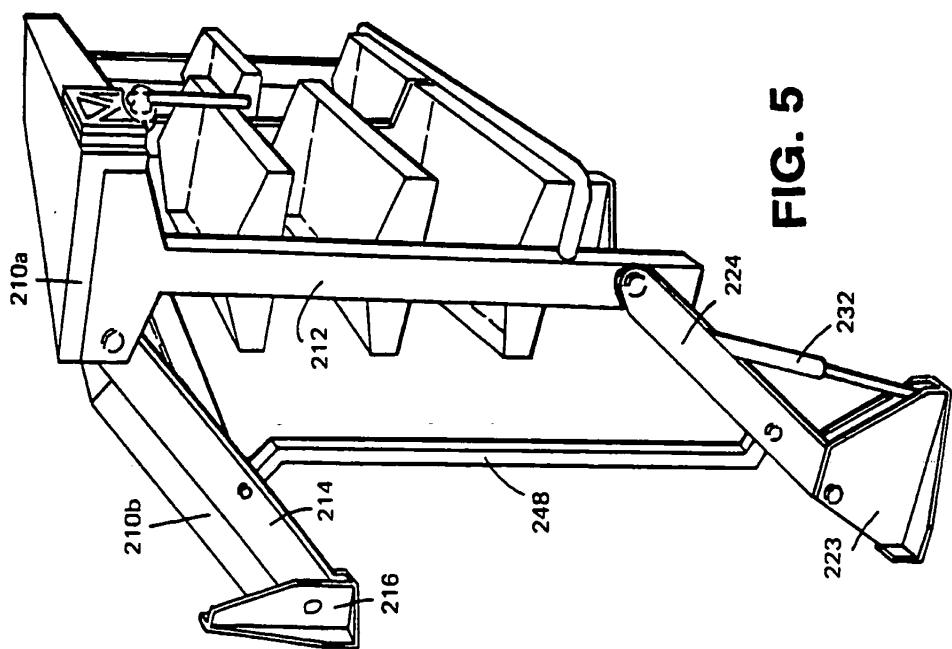
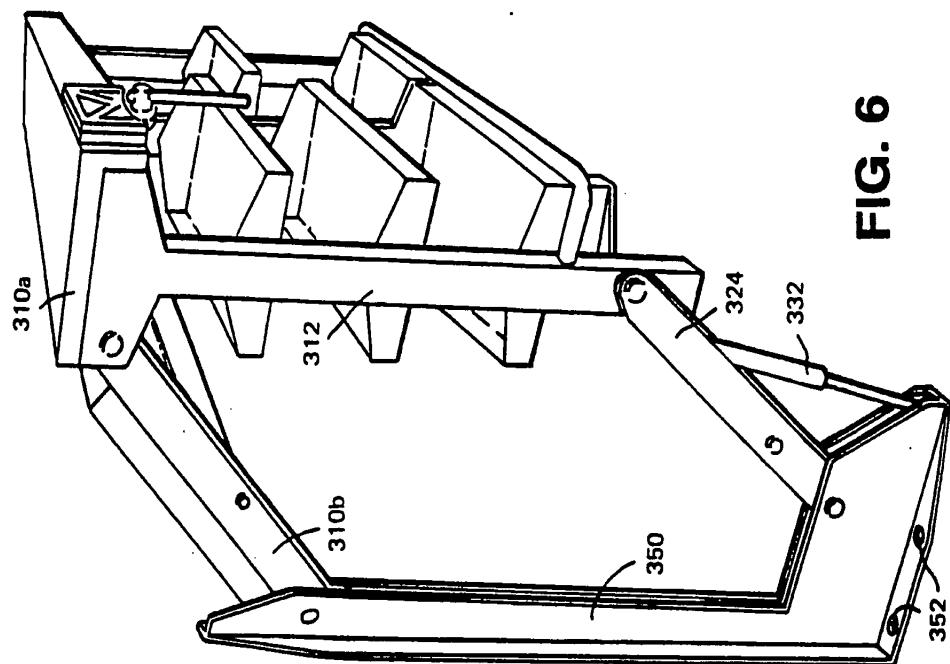


FIG. 3

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 93/01340

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.C1. 5 B25H1/02; A47B5/04

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System	Classification Symbols
Int.C1. 5	B25H ; A47B

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	US,A,1 688 533 (EGER) 23 October 1928	1,4-7, 10,12,13
Y	see figures 1-3 ---	2,9, 14-16,18
X	US,A,4 136 622 (BUE ET AL) 30 January 1979 see abstract; figures 2,11,13 ---	1,10,11
Y	GB,A,2 102 277 (BELLAMY) 2 February 1983 ---	2,9,18
Y	DE,U,8 600 534 (KNÖBEL & SÖHNE KG) 27 February 1986 see page 15, last paragraph; figure 7 ---	15,16
		-/-

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IV. CERTIFICATION

Date of the Actual Completion of the International Search
24 SEPTEMBER 1993

Date of Mailing of this International Search Report

01.10.93

International Searching Authority

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PETERSSON M.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
Y	US,A,3 267 885 (SHORE) 23 August 1966 see column 3, line 28 - line 37; figures 1,2 ---	14
A	US,A,2 716 044 (OVERBY) 23 August 1955 see figures 1,3,4 -----	1

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.

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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-1688533		None		
US-A-4136622	30-01-79	US-A-	4100858	18-07-78
		AU-B-	507771	28-02-80
		AU-A-	3253678	18-10-79
		CA-A-	1087238	07-10-80
		DE-A,C	2802177	27-07-78
		FR-A,B	2377784	18-08-78
		GB-A-	1578686	05-11-80
		JP-C-	1133090	27-01-83
		JP-A-	53093959	17-08-78
		JP-B-	57023489	19-05-82
GB-A-2102277	02-02-83	None		
DE-U-8600534	27-02-86	None		
US-A-3267885		None		
US-A-2716044		None		